AEG
POWER SOLUTIONS

Protect PV - Solar Inverters
User Manual

AEG Power Solutions GmbH

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1. Introduction

1.1. Introduction

This manual provides information on functionality and maintenance of the Protect PV solar inverter.

Illustration 1.1: Protect PV 10 kW, Protect PV 12.5 kW, Protect PV 15 kW

CE	CE marking - This certifies the conformity of the equipment with the regulations which apply in accordance with the directives 2004/108/EC and 2006/95/EC.

The Protect PV inverter series comprises:
Protect PV
Protect PV easy

1.2. Operation Mode Definition

Off grid (LEDs off)
When no power has been delivered to the AC grid for more than 10 minutes, the inverter disconnects from the grid and shuts down. This is the normal night mode. The user and communication interfaces are still powered for communication purposes.

Connecting (Green LED flashing)
The inverter starts up when the PV input voltage reaches 250 V. The inverter performs a series of internal self-tests, including PV auto detection and measurement of the resistance between the PV arrays and earth. Meanwhile, it also monitors the grid parameters. When the grid parameters have been within the specifications for the required amount of time (depends on country settings), the inverter starts to energise the grid.

On grid (Green LED on)
The inverter is connected to the grid and energises the grid. The inverter disconnects if: It detects abnormal grid conditions (depending on country settings), if an internal event occurs or if no PV power is available (no power is supplied to the grid for 10 minutes). It then goes into connecting mode or off grid mode.

Fail Safe (Red LED flashing)
If the inverter detects an error in its circuits during the self-test (in connecting mode) or during operation, the inverter goes into fail safe mode. The inverter will remain in fail safe mode until PV power has been absent for a minimum of 10 minutes, or the inverter has been shut down completely (AC + PV).

Refer to the section on *Troubleshooting* for further information.

2. Display

2

2.1. Display

Note: ✍
Due to the advanced functionalities of the inverter, it may take up to 10 seconds before the display becomes available after power up.

The integrated display on the inverter front gives the user access to all information about the PV system and the inverter.

The display has two modes:

Normal	The display is in use
Power saving	After 10 min. of no display activity the back light of the display turns off to save power. Re-activate the display by pressing any key

Overview of display buttons and functionality:

Illustration 2.1: Display

F1	View 1 / View 2 - Screen
F2	Status Menu
F3	Production Log Menu
F4	Setup Menu
* When an F-key is selected the LED above it will light up.	
Home	Return to View Screen
OK	Enter/select
Arrow up	A step up/increase value
Arrow Down	A step down/decrease value
Arrow Right	Moves cursor right
Arrow Left	Moves cursor left
Back	Return/de-select
On - Green LED	On/flashing = On grid/Connecting
Alarm - Red LED	Flashing = Fail safe
	The inverter is configured as master. Icons can be found in the top right corner.*
	The inverter is connected to a master. Icons can be found in the top right corner.*
*) Protect PV easy only.	

Note: ✍
The contrast level of the display can be altered by pressing the arrow up/down button while holding down the F1 button.

The menu structure is divided into four main sections:

View	Presents a short list of information, read only.
Status	Shows inverter parameter readings, read only.
Production Log	Shows logged data.
Setup	Shows configurable parameters, read/write.

See the following sections for more detailed information.

2.1.1. View

Menu Structure - View

Parameter	Description
Mode: On grid	Displays present inverter mode. See operation mode definitions
Prod. today: 12345 kWh	Energy production today in kWh. Value from inverter or S0 energy-meter
Output Power: 12345 W	Current output power in Watt
[--- utilization bar ---]	Shows level of inverter utilisation as % of max. utilisation

Table 2.1: View

2.1.2. View 2

Menu Structure - View 2

Parameter	Description
Grid mgmt:	Indicates whether or not any grid management measures are in effect. Hidden if no grid management measures are in effect.
Performance ratio: 87 %*	Performance ratio is shown if irradiation sensor is available (local or master).
Total CO_2 saved:123 T*	Lifetime CO_2 emission saved, calculated using configured value.
Total revenue: 234.5 Euro *	Lifetime revenue, calculated using configured value.

Table 2.2: View 2

*) Not available.

2.1.3. Status

Menu Structure - Status

Display Functions	Description
[-] Ambient Conditions	Only applicable if sensors are connected
Irradiance: 1400W/m²	Irradiance. "NC" if not connected
PV module temp: 100 ºC	PV module temperature. "NC" if not connected
Ambient temp: 20 ºC	Ambient temperature. "NC" if not connected
Irr. sensor temp: 20 ºC	Irradiation sensor temperature. "NC" if not connected
[-] Photovoltaic	
[-] Present values	
[-] PV input 1	
Voltage: 1000V	Voltage detected at PV input 1
Current: 15.0 A	Current detected at PV input 1
Power 10000 W	Power detected at PV input 1
[+] PV input 2	
[+] PV input 3	Not visible if inverter type is 10 kW
[-] Isolation Resistance	
Resistance: 45 MΩ	PV isolation at start up
[-] PV Input Energy	
Total: 369000kWh	Daily production of all PV inputs
PV1: 123000 kWh	Daily production of PV input 1
PV2: 123000 kWh	Daily production of PV input 2
PV3: 123000 kWh	Daily production of PV input 3
[-] PV Configuration	
PV input 1: Individual	Configuration of PV input 1. The configuration is only shown when the inverter is in Connecting or On grid mode.
PV input 2: Individual	
PV input 3: Individual	
[-] AC-grid	
[-] Present Values	
[-] Phase 1	
Voltage: 250 V	Voltage on phase 1
Current: 11.5 A	Current on phase 1
Frequency: 50 Hz	Frequency on phase 1
Power: 4997 W	Power on phase 1
[+] Phase 2	
[+] Phase 3	
[-] Residual Current Monitor	
Current: 350 mA	Residual current in mA
[-] Grid management	Only visible if the inverter is set up for feed-in to medium or high voltage grid (e.g. _MV country is the selected country)
[-] Power level adjustment	
[-] Present limit: 100 %	Maximum allowed power output in % of nominal power output. "Off" means that the power level functionality has been disabled in the inverter.
[-] Reactive power	Only displayed if the current country setting is an MV country or custom, and in Protect PV versions.
Setpoint type: Off	The setpoint type for Reactive Power. Off means that no internal setpoints are used, but the inverter will accept an external setpoint.
Value: -	The current value of the setpoint for reactive power, the unit depends on the selected setpoint type.

Table 2.3: Status

Menu Structure - Status - Continued

Display Functions	Description
[-] Inverter	
[-] Country: Germany	Country setting
[-] Internal Conditions	
Power module 1: 100 °C	Temperature detected at the power module
PCB1 (AUX): 100 °C	Temperature detected internally
[-] Serial no. and SW ver.	
[-] Inverter	
Prod- and serial number:	
A0010000201	Inverter product number
011900H2304	Inverter serial number
Software version:	Inverter software version
MAC address:	The MAC address of the communication board
...	
[-] Control board	
Part - and serial number:	
C00100003111	Control board part number
022500H2004	Control board serial number
Software version:	Control board software version
[-] Power board	
Part - and serial number:	
C00100004529	Power board part number
0023600H2104	Power board serial number
[-] AUX board	
Part - and serial number:	
C0010000241	Aux board part number
002541H2204	Aux board serial number
[-] Communication board	
Part - and serial number:	
C0010000201	Communication board part number
032500H2504	Communication board serial number
Software version:	Communication board software version
[-] Func. Safety Processor	
Software version:	Functional Safety processor software version
[-] Display	
Software version:	Display software version
[-] Upload status	
Upload status: Off	Current upload status
Signal strength: 99	Signal strength. Should preferably be between 16-31. 99 Indicates no signal
GSM status: None	Current GSM network status
Network:	Network to which the modem is connected
Failed uploads: 0	Number of consecutive failed uploads
Last error: 0	Last error ID, please see the GSM manual for further assistance
-	Time and date of last error
Last upload:	
-	Time and date of last successful upload

Table 2.4: Status - Continued

2.1.4. Production Log

Menu Structure - Production Log

Display Functions	Description
Total production: 123456 kWh	Total production since installation of inverter
Total operating time: 20 hours	Total operating time since installation of inverter
[-] Production log	
[-] This week	Production from this week
Monday: 37 kWh	Production from one day shown in KWh
Tuesday: 67 kWh	
Wednesday: 47 kWh	
Thursday: 21 kWh	
Friday: 32 kWh	
Saturday: 38 kWh	
Sunday: 34 kWh	
[-] Past 4 weeks	
This week: 250 kWh	Production from this week shown in KWh
Last Week: 251 KWh	
2 Weeks ago: 254 KWh	
3 Weeks ago: 458 KWh	
4 Weeks ago: 254 KWh	
[-] This year	
January: 1000 kWh	Production from one month shown in kWh
February: 1252 KWh	
March: 1254 KWh	
April: 1654 KWh	
May: 1584 KWh	
June: 1587 KWh	
July: 1687 KWh	
August: 1685 KWh	
September: 1587 KWh	
October: 1698 KWh	
November: 1247 KWh	
December: 1247 KWh	
[-] Past years	Yearly production, up to 20 years back
This year: 10000 kWh	Production from this year shown in KWh
Last year: 10000 kWh/m^2	
2 years ago: 10000 kWh/m^2	
3 years ago: 10000 kWh/m^2	
...	
20 years ago: 10000 kWh/m^2	
[-] Irradiation log	Only visible if it contains non-zero values
[-] This week	Irradiation from this week
Monday: 37 kWh/m^2	Irradiation from one day shown in kWh/m^2
Tuesday: 45 kWh/m^2	
Wednesday: 79 kWh/m^2	
Thursday: 65 kWh/m^2	
Friday: 88 kWh/m^2	
Saturday: 76 kWh/m^2	
Sunday: 77 kWh/m^2	
[-] Past 4 weeks	Irradiation from this week shown in kWh/m^2
This week: 250 kWh/m^2	
Last week: 320 kWh/m^2	
2 weeks ago: 450 kWh/m^2	
3 weeks ago: 421 kWh/m^2	
4 weeks ago: 483 kWh/m^2	
[-] This year	
January: 1000 kWh/m^2	Irradiation from one month shown in kWh/m^2
February: 1000 kWh/m^2	
March: 1000 kWh/m^2	
April: 1000 kWh/m^2	
May: 1000 kWh/m^2	
June: 1000 kWh/m^2	
July: 1000 kWh/m^2	
August: 1000 kWh/m^2	
September: 1000 kWh/m^2	
October: 1000 kWh/m^2	
November: 1000 kWh/m^2	
December: 1000 kWh/m^2	
[-] Past years	Yearly irradiation up to 20 years back are shown
This year: 10000 kWh/m^2	
Last year: 10000 kWh/m^2	
2 years ago: 10000 kWh/m^2	
3 years ago: 10000 kWh/m^2	
...	
20 years ago: 10000 kWh/m^2	

Table 2.5: Production Log

Menu Structure - Production Log - Continued

Display Functions	Description
[-] Time stamps	
Installed: 31-12-07	Date of first grid connection
Power down: 21:00:00	When the inverter was last connected to grid
Prod. initiated: 06:00:00	When the inverter first connected to grid today
[-] De-rating	
Total de-rate: 0 h	Period of time the inverter has limited power production in total, shown in hours
Pwr level adjust: 0 h	Due to Power level adjustment
Freq. stabiliza.: 0 h	Due to frequency support
Reactive Power: 0 h	Due to reactive energy support
[-] Reactive Power	Only visible if the current country setting is an MV country or custom, and in Protect PV versions.
[-] Reactive Energy (underexcited):	
1000 000 VArh	
[-] Reactive Energy (overexcited):	
1000 000 VArh	
[-] Event log	
Latest event: 0	The latest event is displayed. The number is for service purposes Zero indicates no error.
[-] Last 20 events	The latest 20 events are displayed
1 : 29-01-2009 14:33:28	Date and time of the event
Grid 29 off	Group - ID - Status of the event
2 : 29-01-2009 14:33:27	
Grid 29 on	
-	
20:	

Table 2.6: Production Log - Continued

2.1.5. Setup

Menu Structure - Setup

Display Functions	Description
[-] External Alarm	Only applicable if external alarm is connected
Stop Alarm	Stop alarm
Test Alarm	Includes testing red LED on front
Alarm time-out: 009 s	Amount of time the alarm is active in seconds. If value is set to 0, alarm time-out is disabled and the alarm will be active until the failure that has triggered the alarm is corrected or the alarm has been stopped. See above.
Alarm state: Disabled	
[-] Setup details	
Language: English	The language in the display; changing the display language does not affect country setting
[-] Inverter details	
Inverter name: AEG PS	The inverter's name. Max. 15 characters and not only numbers.
Group name:* Group name	The name of the group the inverter is part of Max. 15 characters
[-] Master mode*	
Master mode: Enabled*	
[-] Network*	Only visible if Master mode is enabled.
[-] Initiate network scan	
[-] Scan progress: 0%	
[-] Inverters found: 0	
Plant name:* Plant name*	The name of the plant. Max. 15 characters
[-] Set date and time	
Date: dd.mm.yyyy (30.12.2002)	Set the current date
Time: hh.mm.ss (13.45.27)	Set the current time
[-] Calibration	Only applicable if sensors are connected
[-] PV array	
PV input 1: 6000 W	
PV 1 area: 123 m^2	
PV input 2: 6000 W	
PV 2 area: 123 m^2	
PV input 3: 6000 W	Not visible if inverter only has 2 PV inputs
PV 3 area: 123 m^2	Not visible if inverter only has 2 PV inputs
[-] Irradiation sensor	
Scale (mV/1000 W/m^2): 75	Sensor calibration
Temp. coeff: 0.06 %/°C	Sensor calibration
[-] Temp. sensor offset	
PV module temp: 2 °C	Sensor calibration (offset)
Ambient Temp: 2°C	Sensor calibration (offset)
[-] S0 sensor input	
Scale (pulses/kWh): 1000	Sensor calibration. See note
[-] Environment	
CO_2 emission factor:*	Value to be used for total CO_2 saved calculation
0.5 kg/kWh*	
Remuneration per kWh:*	Value to be used for total revenue calculation
44.42 ct/kWh	
Yield start count: 1000 kWh*	A value used as an offset from the current production value when calculating the yield.
[-] Communication setup	Only applicable if communication accessories are connected
[-] RS485 setup	
Network: 15	
Subnet:15	
Address: 255	
[-] IP Setup	
IP config: Automatic	
IP address:	
192.168.1.191	
Subnet mask:	
255.255.255.0	
Default gateway:	
192.168.1.1	
DNS server:	
123.123.123.123	

Table 2.7: Setup

*) Not available.

Menu Structure - Setup - Continued

Display Functions	Description
GPRS connection setup	
SIM PIN code: 0000	4-8 characters
Access point name: name	Max. 24 characters
User name: user	Max. 24 characters
Password: password	Max. 24 characters
Roaming: Disabled	
[-] Data warehouse service	
Upload channel: LAN	
Upload time (h:m): 14:55	
Start log upload	Requires data from at least 10 min. of energy production
D.W FTP server address: www.inverterdata.com	
D.W server port: 65535	
FTP mode: Active	
D.W. server user name:	Default serial number of the inverter
User	User name for Data warehouse account, max. 20 chars.
D.W server password	
Password	Password for Data warehouse account, max 20 chars.
[-] Autotest	Initiate autotest, only applicable with country setting; Italy
Status: Off	
Ugrid: 234 V	Only visible during voltage tests
Utest: 234 V	Only visible during voltage tests
Fgrid: 50.03 Hz	Only visible during frequency tests
Ftest: 50.03 Hz	Only visible during frequency tests
Disconnection time: 53 ms	Not visible in Off and Completed OK states
[-] Logging	
Interval: 10 min*	The interval between each logging
Logging capacity: 10 Days	
[-] Web Server	
Reset password	Resets the password of the Web Server to its default value
[-] Security	
Password: 0000	Level of access to inverter parameters and settings
Security level: 0	Current security level
Log out	Log out to security level 0
[-] Service logon	Only to be used by authorised service personnel
User name: user name	
Password: password	

Table 2.8: Setup - Continued

*) Not available.

Note: ✍
When a value is set in the S0 energy meter calibration menu the inverter disables its own energy counter in order to show the value from the S0 meter. Therefore the energy count will not be shown if a value is set, even though no S0 meter is connected.

3. Web Server Quick Guide

3.1. Introduction

These instructions describe the Protect PV Web Server, which facilitates remote access to the inverter.
Refer to the download area at www.aegps.com/solarinverters for the newest instructions.

3.2. Supported Characters

In all language versions, the following characters are supported and can be entered via the Web Server:

Letters	abcdefghijklmnopqrstuvwxyz
Capital letters	ABCDEFGHIJKLMNOPQRSTUVWXYZ
Numbers	0123456789
Special characters	.,-+?!@:;/_()#* %
Note! No spaces are allowed in inverter name.	

For plant, group and inverter name, only the following characters are supported:

Letters	abcdefghijklmnopqrstuvwxyz
Capital letters	ABCDEFGHIJKLMNOPQRSTUVWXYZ
Numbers	0123456789
Special characters	- _.
Note! No spaces are allowed in inverter name.	

3.3. Access and Initial Setup

3.3.1. Access via PC Ethernet Interface

Change the Web Server logon and password of the master inverter immediately for optimal security when connecting to the internet. To change the password go to [Setup → Web Server → Admin].

Setup Sequence:

1. Select which inverter will be set up as master.
2. Open the cover of this inverter. Refer to the Protect PV Installation Manual for instructions.
3. Connect the inverter RJ45 interface to the PC Ethernet interface using a patch cable (network cable cat5e, crossed or straight through).
4. On the PC, wait until Windows reports limited connectivity (if no DHCP is present). Then open the internet browser.
5. Type http://invertername in the address field:
   - Find the serial number on the product label, located on the side of the housing.
   - 'Invertername' is the final 10 digits of the serial number (1).

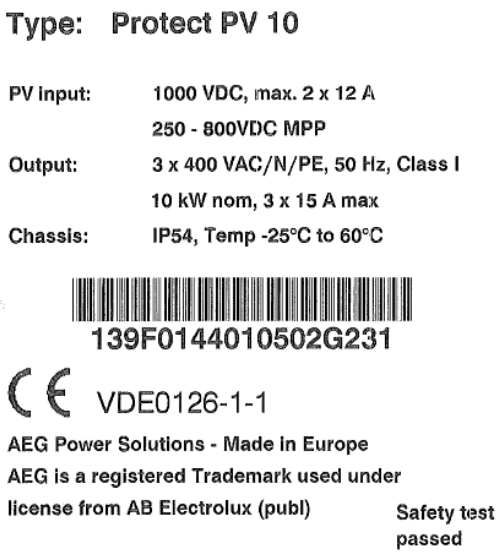

Illustration 3.1: Product Label

6. The Web Server logon dialog opens.
7. Type 'admin' in the user and password fields, and click [Log in].
8. At initial logon the inverter runs a setup wizard. Ensure pop-ups are enabled before the wizard starts.

3.3.2. Setup Wizard

Step 1 of 7: Master setting

To set up a master inverter, click on [Set this inverter as master].

- A scan runs to identify inverters in the network.
- A pop-up window shows the inverters successfully identified.

Click [ok] to confirm that the correct number of inverters has been found.

Illustration 3.2: Step 1 of 7: Master Setting

To change this setting later, refer to *Setup, Inverter Details*.

Step 2 of 7: Display language

Select display language. This is not a country setting.

- The default language is English.

Illustration 3.3: Step 2 of 7: Display Language

To change the language setting later, refer to *Setup, Setup Details*.

Step 3 of 7: Time and date

Enter

- time in 24-hour format
- date
- time zone

Accuracy is important, because date and time are used for logging purposes. Adjustment for daylight savings is automatic.

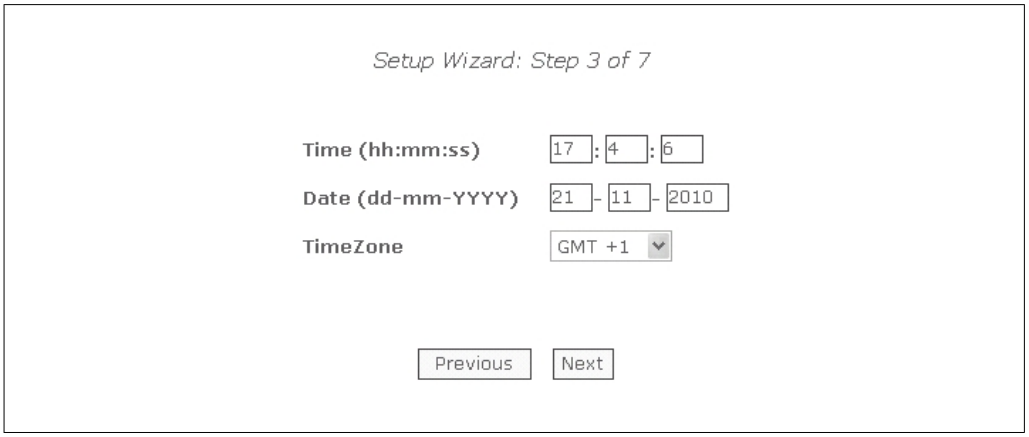

Illustration 3.4: Step 3 of 7: Time and Date

To change these settings later, refer to *Setup, Inverter details, Set Date and Time*.

Step 4 of 7: Installed power

For each PV input, enter

- surface area
- installed power

For more information refer to the Protect PV Reference Manual.

Incorrect setting can have serious consequences for production efficiency.

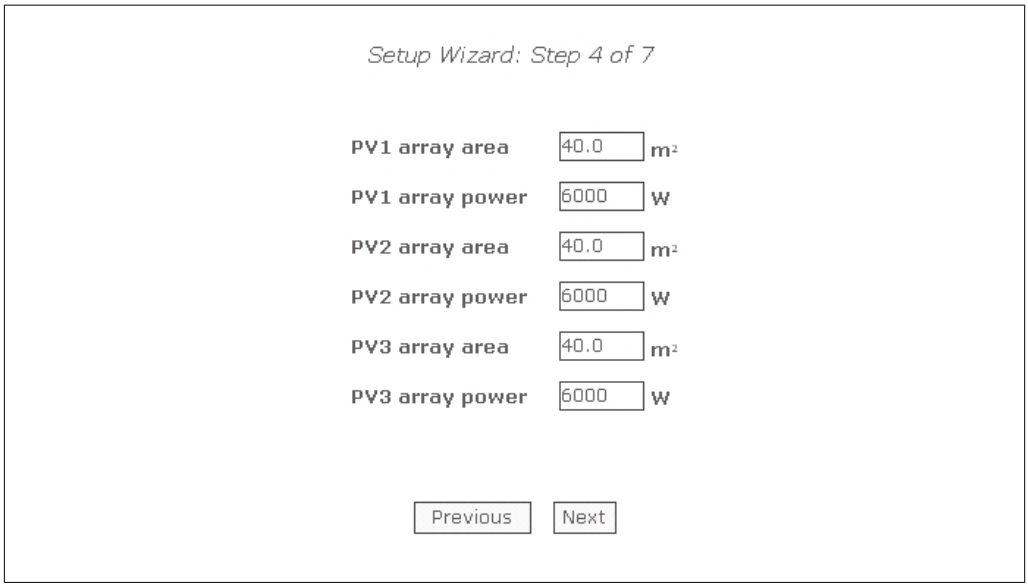

Illustration 3.5: Step 4 of 7: Installed Power

To change the installed power, refer to *Setup, Calibration, PV Array*.

Step 5 of 7: Country setting

Select the country setting to match the installation. To meet medium voltage grid requirements select a country option ending in MV.

- The default setting is [undefined].

Select the country setting again, to confirm.

- The setting is activated immediately.

Correct selection is essential to comply with local and national standards.
An incorrect setting can have serious consequences.

Illustration 3.6: Step 5 of 7: Country Setting

Note: ✍
If the initial and confirmation settings are different,

- country selection is cancelled
- the wizard recommences step 5

If initial and confirmation settings match, but are incorrect, contact service.

To change the country setting later, refer to *Setup, Setup Details.*

Step 6 of 7: Replication

To replicate the settings from steps 1 to 6 to other inverters in the same network

- Select inverters
- Click [Replicate]

Note: ✍
When the PV configuration, installed PV power and PV array area of follower inverters in the network differ from that of the master, do not replicate. Set up the follower inverters individually.

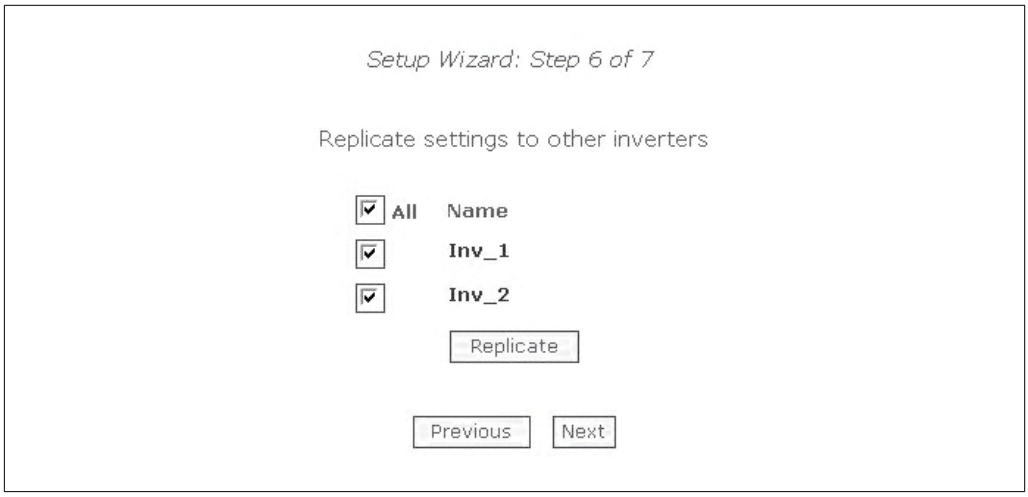

Illustration 3.7: Step 6 of 7: Replication

Step 7 of 7: Inverter startup

The inverter will start automatically when the installation sequence is complete (see the Protect PV Installation Manual), and solar radiation is sufficient.
The startup sequence, including self-test, takes a few minutes.

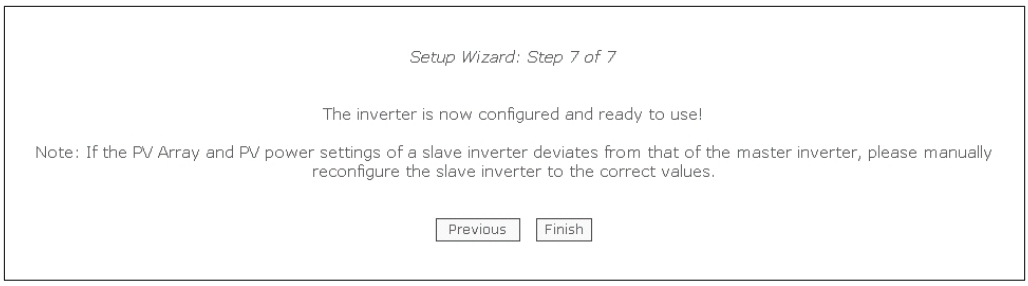

Illustration 3.8: Step 7 of 7: Inverter startup

To change the setup later, access the inverter via the integrated web interface or the display, at inverter level.

- To change the name of the inverter, go to [Setup → Inverter details]
- To enable master mode, go to [Setup → Inverter details]

3.4. Operation

3.4.1. Web Server Structure

The Web Server overview is structured as follows.

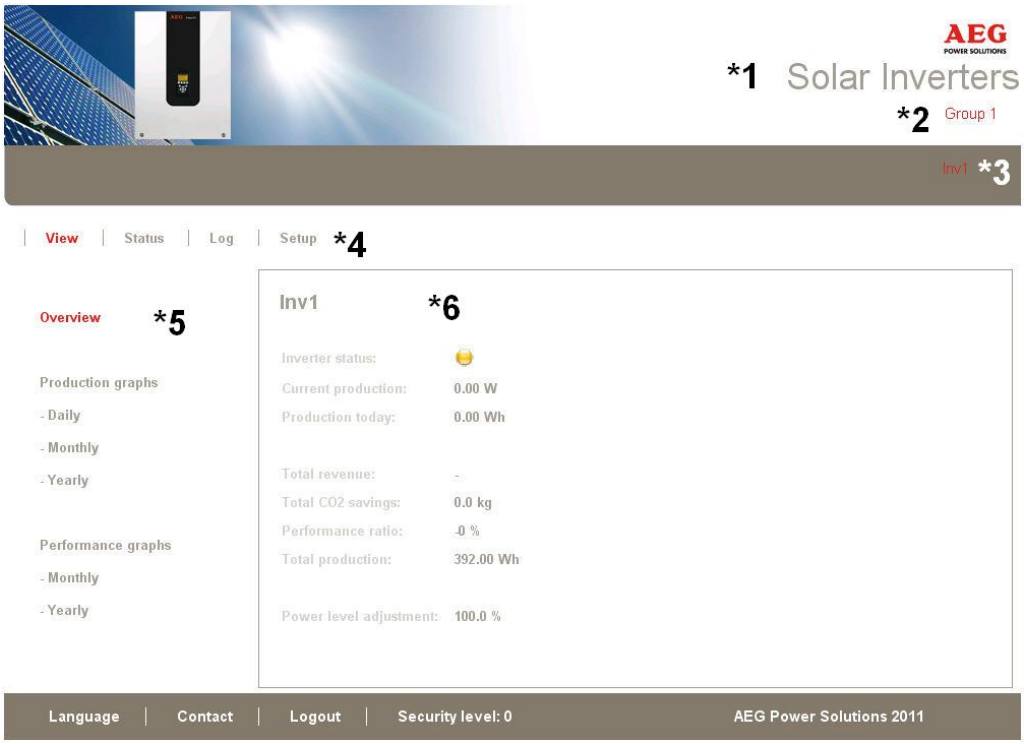

Illustration 3.9: Overview

1. **Plant name:** Displays the current plant name:
   - Click on the plant name to display the plant view.
   - Change the plant name at [Setup → Plant details].
2. **Group menu:** Displays groups of inverters:
   - Inverters join group 1 by default
   - Click on a group name to display the group view, and a list of inverters in the group.
   - Change the group name via [Setup → Inverter details] in the inverter view.
3. **Group members:** Displays the inverter names in the group currently selected. The default inverter name is based on the serial number (see section *Accessing the* Web Server):
   - Click on an inverter name to display the inverter view.
   - Change the name of the inverter via [Setup → Inverter details] in the inverter view.
4. **Main menu:** This menu corresponds to the inverter display main menu.
5. **Sub menu:** The sub menu corresponds to the main menu item currently selected. All sub menu items belonging to a particular main menu item are displayed here.
6. **Content area:** The Web Server main menu and sub menus are identical to the menus in the inverter display. The sub menu content displayed here corresponds to the sub menu selected: [Overview]. On some pages, a horizontal menu provided for improved readability.
7. **Footer:** Options on the footer bar:
   - **Language:** Opens a pop-up window. Click on the country flag to change the language of the Web Server to the desired language for the active session.

- **Contact:** Opens a pop-up window which displays AEG PS contact information.
- **Logout:** Opens the log in / log out dialog box.
- **Security level:** Displays the current security level as explained in the section *Security Levels*.

Note:
The content of the main menu changes depending on which view is currently selected: the plant, a group of inverters or an individual inverter. The active view is indicated by text in red.

3.4.2. Plant, Group and Inverter Views

The overview screens for plant view, group view, and inverter view display the same overall status information.

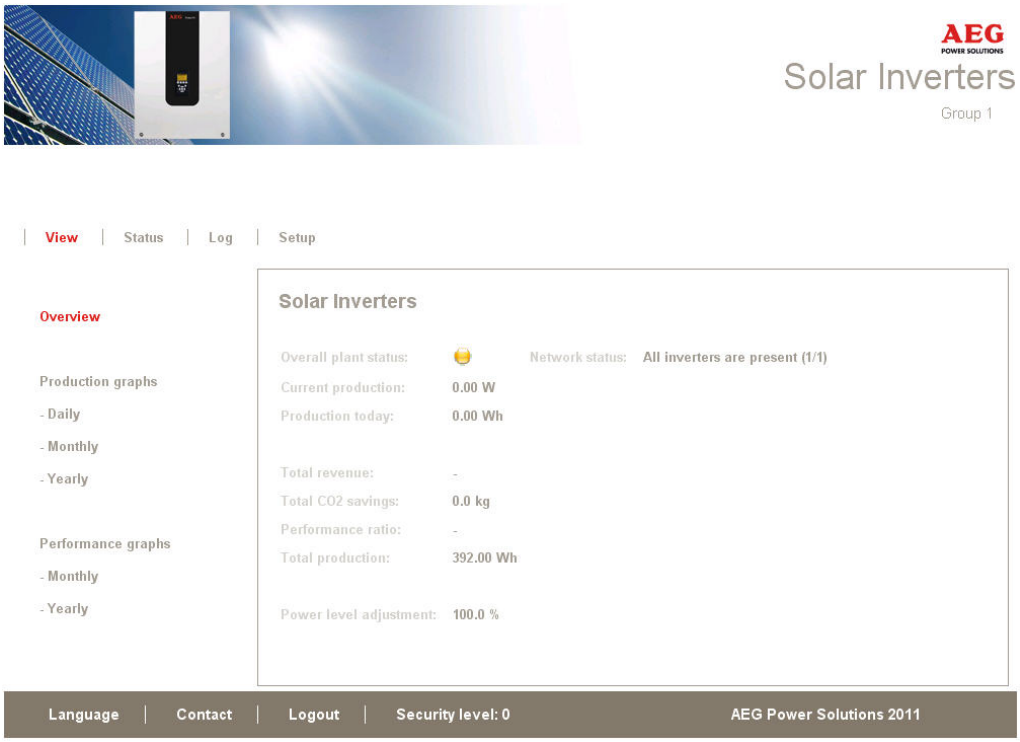

Illustration 3.10: Plant View

Item	Unit	View		Description
		Plant and Group	Inverter	
Overall plant status	-	x		**Red:** Plant PR <50%, or: Any inverter in the network - in fail safe mode, or - missing from the scan list, no contact with the master **Yellow:** Any inverter in the network - with PR<70%, or - in *Connecting* or *Off grid* mode **Green:** Plant PR ≥ 70%, and - all inverters with PR≥ 70%, and - all inverters in *On grid* mode
			x	**Red:** Inverter PR<50%, or inverter has an error **Yellow:** Inverter PR between 51% and 70%, or inverter in *Connecting* mode **Green:** No errors, and - inverter PR≥70%, and - inverter in "on grid" mode
Current production	kW	x	x	Real time energy production level
Yield today	kWh	x	x	Cumulative yield for the day
Total revenue	Euro	x	x	Cumulative revenue earned since initial startup
Total CO_2 saving	kg	x	x	Cumulative CO_2 saved since initial startup
Performance ratio	%	x	x	Real time performance ratio
Total yield	kWh	x	x	Cumulative yield since initial startup
Power limit adjustment	%		x	Maximum power limit as % of nominal inverter AC output rating

Note: ✍
To calculate performance ratio PR, an irradiation sensor is required, see [Setup → Calibration].

3.5. Additional Information

Refer to the Web Server User Manual to learn more about:

- Inverter start-up and check of settings
- Messaging
- Graphs
- Remote access
- Web portal upload
- Logging capacity and changing the logging interval
- Settings backup and restore

4. Troubleshooting

4.1. Troubleshooting

Only trained and authorised personnel familiar with electrical systems and safety issues may work on inverters and electrical installations.

Should the inverter not supply energy as expected, go through the checklist before calling service.

1. Check that the grid is properly connected to the inverter and that the mains switch is not switched off.
2. Check that there is sufficient solar radiation to generate power. U_{PV} >250 V
3. Check for shading and loose cables/connections in the PV system.
4. Check whether the voltage of the PV modules are within the expected values. If not go to point 7.
5. Check whether the voltage values of the grid lie within the threshold values. If this is not the case please contact your public utility for technical assistance.
6. If the above-mentioned points are OK, wait 15 minutes to find out whether there is a permanent failure.
7. If the PV system still supplies no power to the grid, check the display for:
   - PV module voltage, current and power
   - grid voltage, current and power
   - event text, see log area

   Then call service.

In the event of a failure, the red LED will flash and the display will show an event. Refer to the table for event descriptions and recommended actions.

Event text	Description	Remedy
Grid	Grid values are out of range	Check the voltage and frequency values in the display. If values are zero, check the circuit-breaker (fuses) and cables. If values are outside the applied limits, request technical service from installer/energy company.
PV	The PV isolation resistance is too low	Make a visual inspection of all PV cables and modules. If the event occurs frequently, request technical service.
Internal	An internal event has occurred	Make sure airflow over the heat sink is not obstructed. Wait 5 minutes. If the inverter does not reconnect (although sufficient irradiance is available) or the event occurs regularly, action must be taken. Service inverter.
Fail Safe	Internal or AC installation error	Turn off both AC and DC (PV) power to the inverter. Make a visual inspection of the PV installation, if everything is in order, wait 5 minutes and re-apply AC and DC (PV) power. If the inverter resumes fail safe operation, action must be taken. Service inverter.

Table 4.1: Events

Note: ✍
For more event descriptions, refer to the Protect PV Reference Manual in the download area at: www.aegps.com/solarinverters

5. Maintenance

5.1. Maintenance

Normally, the inverter needs no maintenance or calibration.

Ensure the heatsink at the rear of the inverter is not covered.

Clean the contacts of the PV load switch once per year. Perform cleaning by cycling the switch to on and off positions ten times.The PV load switch is located at the base of the inverter.

5.1.1. Cleaning the Cabinet

Clean the inverter cabinet using pressurised air, a soft cloth or a brush.

5.1.2. Cleaning the Heatsink

Clean the heatsink using pressurised air, a soft cloth or a brush.
For correct operation and long service life, ensure free air circulation

- around the heatsink at the rear of the inverter
- to the fan at the inverter base

Do not touch the heatsink during operation.
Temperature can exceed 70°C.

Note: ✍
Do not cover the inverter.
Do not use a water hose, aggressive chemicals, cleaning solvents or strong detergents to clean the inverter.

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